

Claims

- 1. An isolated Band 3 polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO. 1, 2, 3, and 4 as shown herein:
- 5 SEQ ID NO:1: GMPWLSATTVRSVTHANALT (also referred to herein as sequence B3_{5A});

SEQ ID NO:2: SVTHANALTVMGKASTPGAA (also referred to herein as sequence B3_{5B});

SEQ ID NO:3: GKASTPGAAAQIQEVKEQRI (also referred to herein as sequence

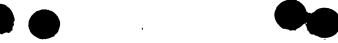
10 $B3_{5C}$);

SEQ ID NO:4: DRILLLFKPPKYHPDVPYVK (also referred to herein as sequence B3_{6A}); and unique fragments thereof, wherein the unique fragments

- (1) bind to an MSP-1 polypeptide and
- (2) exclude the sequences set forth in Table 4:Band 3 Blast Homology

 15 Sequences.
 - 2. An isolated nucleic acid molecule that encodes the isolated polypeptide of claim 1.
- 20 3. An expression vector compensing the isolated nucleic acid of claim 2 operably linked to a promoter.
 - 4. A host cell transfected or transformed with an expression vector of claim 3.
- one or more isolated polypeptides of claim 1; and a pharmaceutically acceptable carrier; wherein the polypeptides are present in an effective amount to induce an immune system response.

6. The composition of claim 5, further comprising an adjuvant.



- 7. A method of making a medicament, comprising:

 placing one or more isolated posseptides of claim 1 in a pharmaceutically acceptable carrier.
- 5 8. A method for identifying a candidate mimetic of an isolated polypeptide of claim 1, comprising

providing an MSP-1 polypeptide which binds the isolated polypeptide of claim 1,

contacting the MSP-1 polypeptide with a test molecule, and
determining the binding of the test molecule to the MSP-1 polypeptide,
wherein a test molecule which binds to the MSP-1 polypeptide and inhibits binding of
the MSP-1 polypeptide to the polypeptide of claim 1 is a candidate mimetic of the
isolated polypeptide of claim 1.

- 9. A protein microarray comprising at least one isolated Band 3 polypeptide selected from the group consisting of SEQ ID NOS. 1, 2, 3, and 4.
 - 10. An anti-Band 3 antibody or fragment thereof that selectively binds to a polypeptide of claim 1, wherein the antibody inhibits infection of cells by P. falciparum merozoite malaria parasite.
 - 11. An anti-idiotype antibody which selectively binds to the idiotype of the antibody of claim 10.
- 25 12. A method for making an anti-lidiotypic antibody comprising:
 immunizing an animal with an antibody of claim 10 under conditions to elicit
 an immune system response to an idiotype of said antibody of claim 10.
- 13. A method for treating a malaria infection, comprising:
 administering to a subject in need of such treatment, an effective amount of an anti-Band 3 antibody of claim 10 to treat the malaria infection.



14. A method for inducing an immune system response to treat a malaria infection, comprising:

administering to a subject in need of such treatment, an effective amount of an anti-Band 3 antibody of claim 10 under conditions to induce an anti-idiotypic immune response to the anti-Band 3 antibody idiotype.

15. A method for identifying a candidate mimetic of a MSP-1 polypeptide, comprising

providing an isolated Band 3 polypeptide which binds a MSP-1 polypeptide, contacting the Band 3 polypeptide with a test molecule, and

determining the binding of the test molecule to the Band 3 polypeptide, wherein a test molecule which binds to the isolated Band 3 polypeptide and inhibits binding of the Band 3 polypeptide to the MSP-1 polypeptide is a candidate mimetic of the MSP-1 polypeptide.

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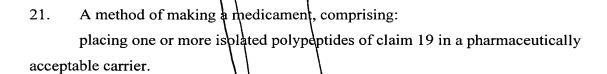
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- 16. The method of claim 15, wherein the MSP-1 polypeptide has a sequence selected from the group consisting of SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:33, SEQ ID NO: 34, and SEQ ID NO:35.
- 20 17. The method of claim 15, wherein the test molecule is an antibody.
 - 18. An isolated polypeptide, wherein the polypeptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOs:11, 12, 13, 33, 34, and 35, or fragments thereof.

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- 19. A pharmaceutical composition comprising:
 one or more isolated polypeptides of claim 18 and
 a pharmaceutically acceptable carrier;
 wherein the polypeptides are present in an effective amount to induce an immune system response.
- 20. The pharmaceutical composition of claim 19, further comprising an adjuvant.



- 22. A method of preventing or treating a malaria infection, comprising administering a pharmaceutical composition of claim 19 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.
- 10 23. A malaria polypeptide birding polypeptide that selectively binds to a isolated malaria polypeptide of claim 18, whereat the binding polypeptide is an antibody or antigen-binding fragment of an antibody.
- 24. A pharmaceutical composition comprising the malaria polypeptide binding polypeptide of claim 23, in a pharmaceutically acceptable carrier.
 - 25. A method of preventing or treating a malaria infection, comprising administering the pharmaceutical composition of claim 24 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.
 - 26. An isolated nucleic acid, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of SEQ ID NOs:54-59, or fragments thereof.
- 27. An isolated Band 3 polypeptide, comprising an amino acid sequence selected from the group consisting of SEQ ID NO. 1, 2, 3, and 4 as shown herein:
 - SEQ ID NO:1: GMPWLSATTVRSVTHANALT (also referred to herein as sequence B3_{5A});
- SEQ ID NO:2: SVTHANALTVMGKASTPGAA (also referred to herein as sequence B3_{5B});

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SEQ ID NO:3: GKASTPGAAAQIQEVKEQRI (also referred to herein as sequence B3_{5C});

SEQ ID NO:4: DRILLLFKPPKYHPDVPYVK (also referred to herein as sequence B3_{6A}), and unique fragments thereof, wherein the unique fragments

- (1) bind to an isolated polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOs:46-53, or fragment thereof, and
- (2) exclude the sequences set forth in Table 4:Band 3 Blast Homology Sequences.
- 10 28. An isolated nucleic acid molecule that encodes the isolated Band 3 polypeptide of claim 27.
 - 29. An expression vector comprising the isolated nucleic acid of claim 29 operably linked to a promoter.
 - 30. A host cell transfected or transformed with an expression vector of claim 29.
- 31. An immunogenic composition comprising:
 one or more isolated Band 3 polypeptides of claim 27 and
 a pharmaceutically acceptable carrier;
 wherein the Band 3 polypeptides are present in an effective amount to induce an immune system response.
 - 32. The composition of claim 31, flyther comprising an adjuvant.
 - 33. A method of making a medicathent, comprising:

 placing one or more isolated Band 3 polypeptides of claim 27 in a
 pharmaceutically acceptable carrier.
- 30 34. A method for identifying a candidate mimetic of an isolated Band 3 polypeptide of claim 27, comprising





providing a malaria polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOs:46-53, or fragment thereof that binds the isolated Band 3 polypeptide or fragment thereof of claim 27,

contacting the malaria polypeptide or fragment thereof, with a test molecule, and

determining the binding of the test molecule to the malaria polypeptide or fragment thereof, wherein a test molecule which binds to the polypeptide or fragment thereof and inhibits binding of the isolated Band 3 polypeptide to the malaria polypeptide, is a candidate mimetic of the isolated Band 3 polypeptide of claim 27.

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35. A method for identifying a candidate mimetic of an isolated malaria polypeptide, comprising

providing a Band 3 molecule which binds a malaria polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOs:46-53,

contacting the Band 3 molecule with a test molecule, and

determining the binding of the test molecule to the Band 3 molecule, wherein a test molecule which binds to the Band 3 molecule and inhibits binding of the malaria polypeptide with the Band 3 polypeptide is a candidate mimetic of the malaria polypeptide.

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- 36. The method of claim 35, wherein the test molecule is an antibody.
- 37. An isolated polypeptide molecule comprising an amino acid sequence selected from the group consisting SEQ ID NOs:46-52.

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38. A pharmaceutical composition comprising:
one or more isolated polypeptides of claim 37 and
a pharmaceutically acceptable carrier;
wherein the polypeptides are present in an effective amount to induce an

immune system response.

39. The pharmaceutical composition of claim 38, further comprising an adjuvant.





- 40. A method of making a medicament, comprising:

 placing one or more isolated polypeptides of claim 38 in a pharmaceutically acceptable carrier.
- 41. A method of preventing or treating a malaria infection, comprising administering a pharmaceutical composition of claim 38 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.
- 10 42. A malaria polypeptide binding polypeptide that selectively binds to a isolated malaria polypeptide of claim 37, wherein the binding polypeptide is an antibody or antigen-binding fragment of an antibody.
- 43. A pharmaceutical composition comprising the malaria polypeptide binding polypeptide of claim 42, in a pharmaceutically acceptable carrier.
 - 44. A method of preventing or treating a malaria infection, comprising administering the pharmaceutical composition of claim 43 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.
 - 45. An isolated nucleic acid molecule selected from the group consisting of:
 - (a) nucleic acid molecules which hybridize under stringent conditions to a nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of SEQ ID NO:38-44 and which codes for a *Plasmodium* polypeptide,
 - (b) deletions, additions and substitutions of the nucleic acid molecules of (a), which code for a *Plasmodium* polypeptide,
 - (c) nucleic acid molecules that differ from the nucleic acid molecules of (a) or (b) in codon sequence due to the degeneracy of the genetic code, and
 - (d) complements of (a), (b) or (c).

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- 46. The isolated nucleic acid molecule of claim 45, wherein the isolated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of SEQ ID NO:38-44.
- 5 47. An isolated nucleic acid molecule selected from the group consisting of:
 - (a) a unique fragment of the nucleotide sequence selected from the group consisting of:

nucleotides 1-1287 of SEQ ID NO:38 between 12 and 1286 nucleotides in length, nucleotides 1-3576 of SEQ ID NO:39 between 12 and 3557 nucleotides in length, nucleotides 1-903 of SEQ ID NO:40 between 12 and 902 nucleotides in length, nucleotides 1-1203 of SEQ ID NO:41 between 12 and 1202 nucleotides in length, nucleotides 1-3996 of SEQ ID NO:42 between 12 and 3995 nucleotides in length, and nucleotides 1-876 of SEQ ID NO:43 between 12 and 875 nucleotides in length, and nucleotides 1-2712 of SEQ ID NO:44 between 12 and 2711 nucleotides in length, and

(b) complements of (a),

wherein the unique fragments exclude nucleic acids having nucleotide sequences that are contained within SEQ ID NO:38-44, and that are known as of the filing date of this application.

- 48. An expression vector comprising the isolated nucleic acid molecule of claim 46 operably linked to a promoter.
 - 49. An isolated polypeptide molecule comprising a unique fragment of amino acid sequence SEQ ID NO:53 that binds to a Band 3 polypeptide.

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